

# DIY

*Worthwhile projects you can build on your own*



## The 2-meter Hentenna

Ever on the lookout for a different gain antenna (one that exhibits greater than unity gain) design that works, I ran across this one called the *hentenna*, made by three Japanese hams for 6 meters. Another ham, WAØITP, re-made the hentenna for 2 meters, and came up with a [workable alternative](#). The name "hentenna" is a play on words, in that the term "hen" is the Japanese word for *strange* or *weird*. It's probably not odd enough to be a good candidate for the ugly antenna contest, but it does look different from most 2-meter antennas.

Its construction is fairly simple, consisting only of a few pieces of copper tubing, associated copper joints, a coaxial cable connector, and a stiff wire. The only challenge to building this antenna is the soldering of the copper joints, which does tend to scare away some well-meaning do-it-yourselfers. Let's see what it's going to take, for us to build one.

The solder kit listed here contains the appropriate propane torch, copper pipe solder, the flux, and the flux brush, all necessary for this project, and yet just enough for a small project like this one. Of course, it can be replaced by the same items that you might already have.

### Parts list

10 feet of  $\frac{1}{2}$ " copper pipe

Two  $\frac{1}{2}$ " copper caps

One copper solder propane torch kit

6 inches of 12 AWG solid copper wire

One pipe cutter and some sandpaper will be useful tools. Steel wool is a good copper polisher.

Two  $\frac{1}{2}$ " copper tees

Four  $\frac{1}{2}$ " copper elbows

One SO-239 bulkhead connector

One each M3 1" screw, split washer, nut

### The construction

Cut four pairs of the  $\frac{1}{2}$ " copper pipe tubing to the following lengths:

Two 31-13/16"

Two 11-1/2"

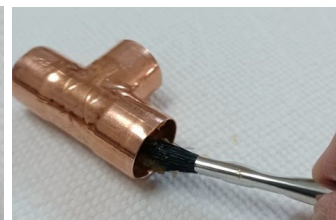
Two 6-1/16"

Two 5-3/8"

If you haven't worked with copper pipe before,

- 1) use a pipe cutter to keep the tubing round
- 2) de-burr all cuts (with sandpaper)
- 3) polish the joining surfaces (with steel wool)
- 4) clean all joining surfaces (with a soft cloth)
- 5) apply flux to all joining surfaces

Let's call the two 5-3/8" lengths the *driven elements*, since those are the pieces that we'll connect the coax to. Clean and polish about 1" of each end of all tubes. Clean and polish about



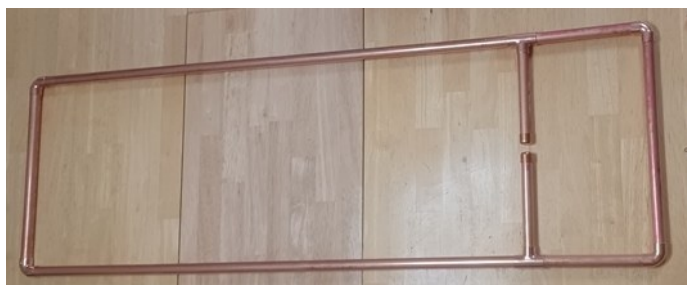


# DIY, continued

## 2-meter Hentenna



$\frac{1}{2}$ " inside the ends of the elbows, the tees, and the caps. Use the flux brush to smooth on a layer of flux over each cleaned surface, completely covering the join surfaces. Insert one of the 31-13/16" tubes into one end of a tee, and one of the 6-1/16" tubes into the other. Insert one of the driven elements into the middle tube of the same tee, and slip the cap onto the other end of each driven element. Repeat this for the other tee, finish assembling all the remaining copper pieces together, then solder-weld each joint. After the joints cool, scrub the solder with warm water (no soap), to remove the excess and burned flux.



*Assembled and ready for soldering*



Drill a 1/8" hole into one of the driven elements, about 1" from the cap end, and parallel with the antenna's long sides. Attach the SO-239 bulkhead connector by one of its four mounting holes to the driven element hole using the M3 screw, lock washer, and nut, then tighten.



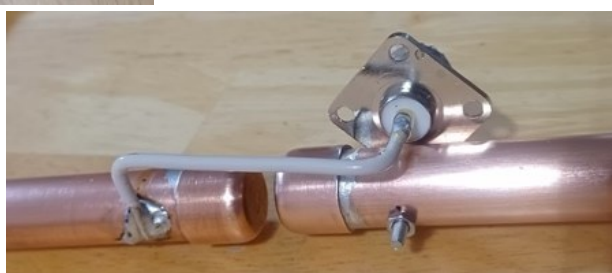
Place an abandoned PL-259 connector onto the SO-239 bulkhead connector to help stabilize it while you're soldering, to prevent the Teflon dielectric from deforming due to melting. Strip and solder one end of a 3-1/2" length of 12 AWG solid copper wire on the rear solder cup of the SO-239 bulkhead, and the other end on the driven element not connected to the bulkhead mounting flange.

You must use a high-wattage (like 100 watts) soldering iron or soldering gun, or the copper tube won't get hot enough to melt the solder, potentially creating a cold solder joint.

Once the antenna cools, remove the PL-259, scrub the new solder joints with water, and you've got yourself an antenna. Let's test it.

### Testing the antenna

Two things to keep in mind when using the hentenna, both consequences of its high-coupling





# DIY, continued

## 2-meter Hentenna

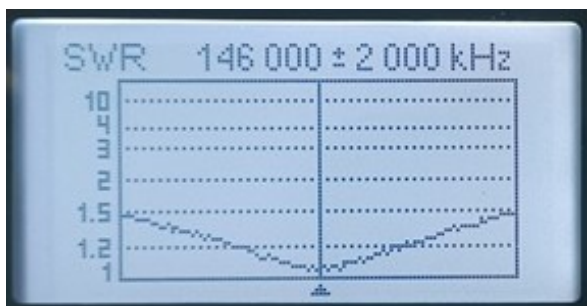


design: it must be used on a non-metal mast and the coax must not run parallel to the driven element. Furthermore, the antenna requires at least ten feet of height over the dirt and anything metal. The orientation of the driven element and the two parallel antenna ends determine the signal polarization, so for vertical polarization, orient the three elements vertically.



*The finished product*

To properly test the hentenna, I mounted a 3D-printed tripod base (made by Eric Hansen N9ERC) and inserted three fiberglass military poles for legs. I zip-tied the antenna onto another fiberglass military pole, connected the coax, zip-tied the coax to the side of the antenna, and began testing. At first, with my analyzer connected by coax to the antenna, I was very encouraged by the promising reading.



Then came the hard test. I connected a pigtail to the coax, to adapt it to my HT, called out for a signal report, and heard nothing, not even the repeater acknowledgement. A little troubleshooting revealed a bad pigtail, which I had recently purchased. So, I got a known-good pigtail, got back on the radio, and right away Jeremy K7TEH gave me a wonderful report through the 146.760 repeater. I got another report from another ham through the 146.780 repeater, and ran out of time to test on simplex. Guess I'll leave that for another day.

*Noji Ratzlaff, KNØJI (kn0ji@arrl.net)*

